CTD data from 39 stations from R/V Cape Hatteras cruise CH0112 in the Northwest Atlantic Continental Shelf in 2012 (CiliateSequencing project)

Website: https://www.bco-dmo.org/dataset/3959
Data Type: Cruise Results
Version: 1
Version Date: 2013-06-07

Project
» Diversity and dynamics of planktonic ciliates - what can next-generation sequencing technologies tell us? (CiliateSequencing)

Contributors	Affiliation	Role
McManus, George	University of Connecticut (UConn - Avery Point)	Principal Investigator
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Abstract
CTD data from 39 stations from R/V Cape Hatteras cruise CH0112 in the Northwest Atlantic Continental Shelf in 2012.

Table of Contents

Coverage

Spatial Extent: **N**:41.2477 **E**:-71.4587 **S**:39.7763 **W**:-71.4673
Temporal Extent: 2012-07-06 - 2012-07-09

Dataset Description

Temperature, conductivity, fluorescence, and oxygen measured by CTD are reported for 39 stations sampled during July 2012 on the CH0112 cruise (R/V Cape Hatteras).

Methods & Sampling

23 stations were sampled along a transect from Narragansett, RI to the shelf break. 16 stations were sampled on the way back.

Header information from CTD files:
Sea-Bird SBE 9 Data File:
Software Version Seasave V 7.20a

Temperature SN = 0967
Conductivity SN = 0626
Number of Bytes Per Scan = 41
Number of Voltage Words = 4
Number of Scans Averaged by the Deck Unit = 1
Append System Time to Every Scan

Data Processing Description

CTD processing: SeaSoft (V 7.20a) was used to convert from hexadecimal raw data, then a low pass filter was made on T and C data, using SeaSoft to synchronize instrument time constants. loopedit was used in SeaSoft to smooth out loops in the CTD path as it went down.

NOTE: Fluorescence values should be interpreted as "arbitrary units" because calibrations have not been applied.

[table of contents | back to top]

Data Files

File
CTD_CH0112.csv (Comma Separated Values (.csv), 25.34 MB) MD5:2e83f577b86aa7b5d6b535df1404ede1 Primary data file for dataset ID 3959

[table of contents | back to top]

Parameters

Parameter	Description	Units
sta	Station ID number.	unitless
lat_start	Latitude at start of CTD cast. North = positive.	decimal degrees
lon_start	Longitude at start of CTD cast. West = negative.	decimal degrees
month_start	2-digit month at start of cast.	mm (01 to 12)
day_start	2-digit day of month at start of cast.	dd (01 to 31)
year	4-digit year in YYYY format.	unitless
time_start	Time at start of cast (UTC).	HHMM.mm
ISO_DateTime_UTC	Date/time (UTC) at start of cast formatted to ISO 8601 standard.	YYYY-MM-DDTHH:MM:SS[.xx]Z
press	Pressure	decibars
depth	Depth	meters
cond	Conductivity in Siemens per meter.	S/m
temp	Temperature (degrees Celsius) from primary sensor.	degrees C
temp2	Temperature (degrees Celsius) from secondary sensor.	degrees C
fluor	Chlorophyll fluorescence (micrograms per liter) measured by Chelsea Aqua 3 sensor. Fluorescence values should be interpreted as "arbitrary units" because calibrations have not been applied.	ug/L
O2	Oxygen (milligrams per liter) measured by SBE 43 sensor.	mg/L
scan	CTD scan number.	integer

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	CTD Sea-Bird 9
Generic Instrument Name	CTD Sea-Bird 9
Generic Instrument Description	The Sea-Bird SBE 9 is a type of CTD instrument package. The SBE 9 is the Underwater Unit and is most often combined with the SBE 11 Deck Unit (for real-time readout using conductive wire) when deployed from a research vessel. The combination of the SBE 9 and SBE 11 is called a SBE 911. The SBE 9 uses Sea-Bird's standard modular temperature and conductivity sensors (SBE 3 and SBE 4). The SBE 9 CTD can be configured with auxiliary sensors to measure other parameters including dissolved oxygen, pH, turbidity, fluorometer, altimeter, etc.). Note that in most cases, it is more accurate to specify SBE 911 than SBE 9 since it is likely a SBE 11 deck unit was used. more information from Sea-Bird Electronics

[table of contents | back to top]

Deployments

CH0112

Website	https://www.bco-dmo.org/deployment/59041
Platform	R/V Cape Hatteras
Start Date	2012-07-06
End Date	2012-07-09
Description	Cruise departed from and returned to Narragansett, RI. 39 stations were completed in 3 days. Each station included a CTD cast, water sampling, and a plankton net tow. Part of the project "Diversity and dynamics of planktonic ciliates - what can next-generation sequencing technologies tell us?" Sampling activity included: CTDFO Zooplankton (vertical tows 150 um mesh) Plankton DNA (3-5 depths); 2 L sample Preserved (lugols) for microzooplankton (3-5 depths) Cruise information and original data are available from NSF R2R data catalog.

[table of contents | back to top]

Project Information

Diversity and dynamics of planktonic ciliates - what can next-generation sequencing technologies tell us? (CiliateSequencing)

Website: http://microzooplankton.uconn.edu

Coverage: NW Atlantic Continental Shelf

The Ocean's biomass and diversity are predominantly microbial, yet this aspect of diversity remains underexplored. Efforts in recent years have begun to document microbial diversity in marine systems, and to elucidate the processes that structure assemblages across space and time. This project focuses on two important sister clades of microbial eukaryotes, the oligotrich and choreotrich ciliates. These organisms comprise a major component of planktonic food webs as they graze on phytoplankton, and are in turn eaten by zooplankton and larval fish.

Earlier molecular work on ciliate diversity relied on light microscopy, construction of clone libraries and Sanger sequencing. This revealed a high degree of cryptic diversity (similar species that are genetically distinct), which is surprising, given the long-held idea that all microbes are globally distributed and that few species exist, at least as compared to animals and plants. This past work also showed that ciliate assemblages contain a few highly abundant forms and many rare ones, consistent with the concept of a "rare biosphere". However, these methods are limited by high costs of both labor and materials, so that efforts to sample any local assemblage comprehensively usually resulted in undersaturation (repeated sampling continued to uncover new species). Next generation approaches are needed to truly assess the depths of biodiversity in planktonic ciliates.

This project brings together investigators with strengths in ecology, taxonomy and oceanography (PI McManus) and in molecular evolution, systematics and bioinformatics (PI Katz). Pyrosequencing will be used to sample the oligotrich and choreotrich ciliates 'to exhaustion' in coastal environments. Denaturing gradient gel electrophoresis (DGGE), a technique that generates a fingerprint of the diversity in a sample, will be used to pre-select samples for pyrosequencing based on where strong gradients are observed in the composition of assemblages in relation to environmental factors (density fronts, thermolclines, etc.). Using these approaches, combined with the informatics pipeline already in place, this project will address three specific objectives:

Objective 1. Determine the spatial scale of variability in ciliate diversity by measuring how ciliate assemblages change over meter, kilometer, 100 km, and basin scales.

Objective 2. Assess the contributions of different size classes of ciliates to overall assemblage diversity.

Objective 3. Experimentally evaluate factors that control the temporal shift of individual species from rarity to commonness in a natural assemblage, and vice versa.

Note: See the related collaborative project, "Patterns of diversity in planktonic ciliates: spatio-temporal scales and community assembly in the coastal ocean", funded by awards OCE-1435515 and OCE-1436003.

[table of contents | back to top]

Funding

Funding Source	Award
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[table of contents | back to top]